

What is claimed is:

1. A mobile group proxy for use by a client to call a group of services in a distributed computing application comprised of:

a mobile group shell code module containing logic to interact with the group; and

5 at least one mobile service proxy code module containing logic for the client to interact with one of the services in the group.

2. The mobile group proxy described in claim 1 wherein the mobile group proxy is created while the application is executing.

10 3. The mobile group proxy described in claim 1 wherein the mobile group proxy can be modified while the application is executing.

4. The mobile group proxy described in claim 1 wherein the group proxy is able to buffer commands from the client to the group of services when the group is not available.

5. A method of creating a group proxy for use by a client to call a group of services in a distributed computing application comprising the steps of:

selecting a group logic shell for the group;

selecting at least one service proxy for a service within the group; and

combining the group logic shell with the at least one service proxy.

6. The method of claim 5 wherein the group logic shell is selected based upon the type of group structure desired.

20 7. The method of claim 6 wherein the group structure is peer or coordinator cohort.

8. The method of claim 5 wherein the steps of claim 5 are repeated to create a plurality of group proxies for a plurality of groups of services.

9. The method of claim 5 wherein the steps are performed while the application is executing.

25 10. The method of claim 5 wherein the group logic shell and the at least one service proxy are mobile and the resulting group proxy is mobile.

11. The method of claim 5 further comprising the step of the group proxy buffering commands from the client to the group when the group is not available.

30 12. A computer readable medium containing instructions for controlling a computer system to perform a method of creating a group proxy for a group of services in a distributed computing application, the method comprising:

selecting a group logic shell for the group;

selecting at least one service proxy for a service within the group; and

combining the group logic shell with the at least one service proxy.

13. The computer readable medium of claim 12 wherein the group logic shell is selected based upon the type of group structure desired.

5 14. The computer readable medium of claim 13 wherein the group structure is peer or coordinator cohort.

15. The computer readable medium of claim 12 wherein the steps of claim 12 are repeated to create a plurality of group proxies for a plurality of groups of services.

10 16. The computer readable medium of claim 12 wherein the steps are performed while the application is executing.

17. The computer readable medium of claim 12 wherein the group logic shell and the at least one service proxy are mobile and the resulting group proxy is mobile.

18. The computer readable medium of claim 12 wherein the method is further comprised of the step of the group proxy buffering commands from the client to the group when the group is not available.

19. A distributed computing system comprising:

a plurality of computing devices;

a plurality of services, operating on at least one of the computing devices, arranged into a group;

20 a client, operating on at least one of the computing devices, that calls the group to perform a task;

a group proxy, operating on at least one of the computing devices, used by the client to communicate with the group;

25 a group service, operating on at least one of the computing devices, that creates and updates the group proxy; and

a communication network allowing the services and client to communicate with each other across the computing devices.

20. The system described in claim 19 wherein the group is a peer group or coordinator cohort group.

30 21. The system described in claim 19 further comprised of additional services arranged into at least one additional group.

22. The system described in claim 21 wherein at least one of the groups is comprised of a single service.
23. The system describe in claim 21 wherein all the services in each group perform the same task.
- 5 24. The system described in claim 21 further comprising a group proxy for each group.
25. The system described in claim 19 further comprising a grouping agent, operating on at least one of the computing devices, which communicates on behalf of at least one service within the group, with the group service and other services within the group.
- 10 26. The system described in claim 25 further comprising a dedicated grouping agent for each service that is a member of the group.
27. The system described in claim 19 wherein the plurality of computing devices are virtual machines within a general purpose computer.
28. The system described in claim 19 further comprising a look-up service, operating on at least one of the computing devices, that lists the group and some of the other services available in the system.
29. The system described in claim 28 wherein the look-up service and the group service are combined into a single service.
30. The system described in claim 19 further comprising a plurality of clients.
31. The system described in claim 19 wherein the group proxy is further comprised of a group logic shell and at least one service proxy.
- 20 32. The system described in claim 19 wherein the group proxy is mobile.
33. The system described in claim 19 wherein the group proxy is capable of buffering commands from the client to the group when the group is not available.
34. A distributed computing system comprising:
- 25 a plurality of computing devices;
- a plurality of services, operating on at least one of the computing devices, arranged into a plurality of groups, with each of these services having an associated service proxy, operating on at least one of the computing devices, said service proxy used to call its associated service;
- 30 a plurality of clients, operating on at least one of the computing devices, that call the groups to perform tasks;
- a plurality of group proxies, each group proxy being associated with a group, operating on at least one of the computing devices, and being used by a client to communicate with its associated group, and each group proxy being comprised of:

a group logic shell containing the logic necessary to communicate with the associated group; and

at least one of the service proxies associated with a service within the associated group;

5 a group service, operating on at least one of the computing devices, that creates and updates the group proxy;

a plurality of grouping agents, each grouping agent being associated with a grouped service, operating on at least one of the computing devices, and communicating on behalf of its associated service with the group service and other services within its group; and

10 a communication network allowing the computing devices to communicate with each other.

35. The system described in claim 34 wherein the groups are peer groups or coordinator cohort groups.

36. The system described in claim 34 wherein at least one of the groups is comprised of a single service.

37. The system described in claim 34 wherein all the services in each group perform the same task.

38. The system described in claim 34 wherein the plurality of computing devices are virtual machines within a general purpose computer.

20 39. The system described in claim 34 further comprising a look-up service, operating on at least one of the computing devices, that lists some of the other services and groups available in the system.

40. The system described in claim 39 wherein the look-up service and the group service are combined into a single service.

25 41. The system described in claim 34 wherein the group proxies are mobile.

42. The system described in claim 34 wherein the group proxy are capable of buffering commands from the client to the group when the group is not available.

43. A method of grouping services in a distributed computing application comprising the steps of:

30 initiating a plurality of services arranged into a group, with each service having its own service proxy and grouping agent;

each grouping agent registering its associated service with a group service including providing the group service with the service proxy of the service it is registering;

the group service bundling a group logic shell with at least one of the service proxies to form a group proxy for the group;

the group service providing the group proxy to a client; and

the client using the group proxy to call the group.

5 44. The method described in claim 43 wherein the group is a peer group or a coordinator cohort group.

45. The method described in claim 43 wherein the services are arranged into a plurality of groups, there is a group logic shell for each group and the group service creates a group proxy for each group.

10 46. The method described in claim 43 wherein the group service provides the group proxy to the client by registering the group proxy with a look-up service.

47. The method described in claim 43 further comprising the step of the group proxy buffering commands from the client to the group.

15 48. A computer readable medium containing instructions for controlling a computer system to perform a method of grouping services in a distributed computing application, the method comprising the steps of:

initiating a plurality of services arranged into a group, with each service having its own service proxy and grouping agent;

associating each service in the group with its own grouping agent;

20 each grouping agent registering its associated service with a group service including providing the group service with the service proxy of the service it is registering;

the group service bundling a group logic shell with at least one of the service proxies to form a group proxy for the group;

the group service providing the group proxy to a client; and

25 the client using the group proxy to call the group.

49. The computer readable medium of claim 48 wherein the group is a peer group or a coordinator cohort group.

30 50. The computer readable medium of claim 48 wherein the services are arranged into a plurality of groups, there is a group logic shell for each group and the group service creates a unique group proxy for each group.

51. The computer readable medium of claim 48 wherein the group service provides the group proxy to the client by registering the group proxy with a look-up service.

52. The computer readable medium of claim 48 wherein the method is further comprised of the step of the group proxy buffering commands from the client to the group.

53. A distributed computing system comprising:

a plurality of computing devices;

5 a service operating on at least one of the computing devices;

a client, operating on at least one of the computing devices, that requests the first service to perform a task;

10 a mobile group proxy associated with the service for handling communication between the client and the first service and able to buffer commands from the client to the first service when the first service is not available; and

a communication network allowing the service and the client to communicate with each other across the computing devices.

54. The system described in claim 53 wherein the plurality of computing devices are virtual machines within a general purpose computer.

55. The system described in claim 53 further comprising a plurality of services arranged into at least one group.

56. The system described in claim 53 wherein the group proxy is able to buffer commands from the client to the service when the first service is not available.

57. The system described in claim 53 further comprising a look-up service, operating on at least one of the computing devices, that lists the service.